IRAC-IR&DC-4/74
18 October 1974

MEMORANDUM FOR: Members of the Intelligence Research and Development Council

SUBJECT: Draft Memorandum Concerning Mass Memory Technology

1. During meetings held in the January to July time frame, the Council surfaced the need to explore technological opportunities for developing new memory media and techniques. This R&D initiative was further identified in the Council's July 1974 report to the DCI as a key technology area wherein modest initiatives could now lead to ultimate high payoff. The IRAC concurred with the Council's recommendation.

2. At the 22 August Council meeting, Dr. Lukasik, Director, ARPA, with assistance from the CIA member, Dr. Stevens, was requested by the Chairman to prepare and establish a framework for pursuing this initiative.

3. The attached draft memorandum, which sets forth a program plan, was submitted to the Council by Dr. Lukasik at the 17 October meeting. It is forwarded to the members for consideration and comment. Members are requested to provide comments/concurrence to the Secretariat by COB 25 October.

[redacted] 25X1

Executive Secretary

Attachment as stated

25X1

[redacted]

DRAFT

MEMORANDUM FOR DIRECTOR, DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

SUBJECT: Program Plan for Advanced Computer Memory Technology

I have recently reviewed the status of current U.S. computer memory development and the potential long-range DoD need for more advanced computer memories. It appears that commercial organizations will continue to extrapolate conventional memory technology to meet near-term DoD needs. However, there are areas of need looming on the horizon in the mid-1980's and beyond which will not be satisfied by these extrapolations. At the same time, there appear to be several new concepts which could be pursued and which, if successful, would provide us with a quantum leap forward in mass memory technology. Furthermore, there is an historical perspective on computer growth and utility which closely relates such progress to memory technology advances. Therefore, it is my conviction that DoD should take the lead in exploring high risk technological opportunities for developing radically new memory media and techniques. In addition, I would expect this initiative to serve as a stimulus for new and fruitful relationships between the DoD and U.S. universities.

I am, therefore, requesting ARPA to prepare as one of several new ARPA initiatives a DoD program plan of research into fundamental concepts underlying advanced computer memories and into phenomena and techniques that will provide new bases for memories in the 1985-95 time period. The program should stimulate exploration of new memory media and methods and should provide a motivating and organizing focus for fundamental work in pertinent areas of physics, chemistry, biophysics and engineering, as well as computer science.

It is important to attack this problem in a multi-disciplinary manner because revolutionary rather than evolutionary approaches will be necessary both to achieve the quantum jump in capability required as well as to explore the widest possible range of potentialities. Some DoD applications which will certainly challenge physical capabilities in the mid-1980's are intelligence information processing, physical process and system simulations, and large time-sharing command, control and communication problems.

Enclosure 1

Planning for the required technology program should begin with an analysis of national security needs for memory systems in the coming decades, but the program plan should not be limited by a mere extrapolation of present applications or technologies. The potentials of molecular, crystal, organic, and even biological memories should be investigated. However, new departures and long extrapolations in solid-state, magnetic, electron-beam, laser and other "conventional" memory media should not be ignored. Very dense memories of medium size should be held as goals in addition to very large memories. Software and the systems implications for advanced computer architecture should be explored as part of the program also.

The plan should be formulated in terms of initial major objectives and fiscal projections and should be submitted to me by January 1, 1975.

Malcolm R. Currie